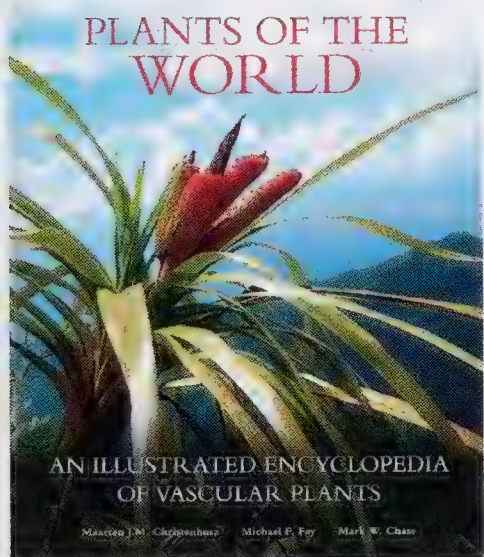


Review



Plants of the World. An Illustrated Encyclopedia of Vascular Plants, By M. J. M. CHRISTENHUSZ, M. F. FAY, AND M. W. CHASE. 2017. Kew Publishing, Royal Botanic Gardens, Kew, United Kingdom and The University of Chicago Press, Chicago, IL. 816 pp. ISBN 978-1-84246-6346 (hardcover). Price \$95.00, hardcover illustrated edition; \$76, Kindle edition.

Literature resources that cover descriptions of all plant families have been few and very far between over time—Engler and Prantl’s, *Die Natürlichen Pflanzenfamilien*, was published from 1887 to 1915; Hutchinson’s *The Families of Flowering Plants* in its 3rd edition was published in 1973; Cronquist’s *An Integrated System of Classification of Flowering Plants* was published in 1981. While these treatments remain of historical interest, plant classification—especially that of the angiosperms—has changed mightily over the recent decades, and continues to do so. This is largely due to the advent of DNA-based phylogenetic data that have become commonplace and affordable. The work of the Angiosperm Phylogeny Group (APG) website, which has utilized these data, has been the principal resource for reviewing phylogenetic relationships of plant families since the early 2000s. Now, a new print resource exists that covers the families of vascular plants—every one of them—conforming *almost* entirely to the treatment produced by the APG IV. It is likely to become a major reference for botanists well into the future.

The meat of the book is an evolutionary sequential treatment, order by order, of all 451 families from Lycopodiales to Apiales. Each one is illustrated with one or more high quality photos. Very few treatments rely solely on a line drawing or herbarium specimen. Although the details are dense, even the lay reader is likely to find the writing very accessible *and* the scientific information has not been compromised. For those of us who are obsessed with family-level taxonomy, the book is pure fun.

The first item is a two-page layout of a sample treatment titled “How to use this book.” Then before getting to the family treatments, there are brief introductory chapters on Evolution of Land Plants, Plants and Human Culture, Naming Plants, Classification and the APG, Fossil Plants, Families, Genera, Phytogeography, and Economic Botany.

Of particular interest, for the lay reader and scientist alike, is the informal ‘Tree of Life’ presented on p. 11. This is a cartoon drawing depiction of what appears to be a deciduous tree, where each branch accurately indicates the relationships of all terrestrial green plant orders. The main trunk is the central phylogenetic backbone. Major groupings above order (i.e., lycopods, ferns, gymnosperms, and angiosperms) are artfully depicted by green leaves surrounding the appropriate orders. There are even numbers at the “branching” nodes indicating in millions of years, when each order emerged in the distant past.

Following the introductory chapters, each family is grouped into its appropriate order and then detailed with sections on: key characteristics, sometimes with exceptional or errant characters included; distributional range, which indicates the family’s natural range on a worldwide map; phylogeny and evolution, which includes discussions of previous systematic placement(s) of the family; an alphabetical list of genera with the number of species within each genus; uses by humans, which is often extremely extensive (e.g., the entry for Asteraceae goes on for six pages, and if you have questions on *Citrus* species and cultivars, find the answers here); and finally there is a brief etymology of the family name. Each family is given a common name, and while it remains uncertain how useful these will be, common family names should attract the attention of readers who want to know more about the jumbly-pepper family, the snake-mushroom family, the wantsum family, and so on.

In addition, scattered across the book are discussions of interest peculiar to certain families where the authors warn that “it is important to know your taxonomy!”. Samples include “rosehip cruelty” (Rosaceae); “from the seed of a hanged man” (Solanaceae); “I see you — man-eaters?” (Fouquieriaceae); “crying flowers” (Actinidiaceae); “mistaking *Veratrum* for *Gentiana*, with fatal consequences.” Other occasional entries are the vignettes highlighting famous taxonomists who made major contributions to understanding plant family relationships. Among these, a brief bio-sketch of Engler and Prantl appears in the treatment for Loranthaceae (*Englerina* is a genus in that family). Another biosketch of Art Cronquist, who passed away while examining herbarium specimens of *Mentzelia*, is placed with the Loasaceae.

Plant family records are included where appropriate. For example, *Polylepis tarapacana*—highest elevation for a tree (5100 m); *Lomatia tasmanica*—oldest clone (43,600 years); *Ranunculus lobatus*, *Arenaria bryophylla*, and *Solms-laubachia himalayen-*

sis—highest elevation (7,756 m); *Silene stenophylla*—longest seed dormancy (31,800 years).

Past the family treatments there is a 32-page glossary nicely illustrated with high quality photographs; although the scope is impressive, the authors reference the even more complete Kew plant glossary (Beentje 2010). While most academics will not need a glossary, it will be very welcome by the general reader. The book is completed with a Further Reading section, a family-by-family bibliography to get you closer to each taxon. There is also a nice set of general references.

There are likely to be places in the book where what is written may not be consistent with the reader's understanding of the family. For example, Polemoniaceae are described to have unequal stamens. This is true for *Phlox* and *Microsteris*, but most genera in the family have equal stamens. Further, botanists used to the Jepson Manual will read that the family contains only 18 genera, and may be puzzled to note that *Leptosiphon*, *Microsteris*, *Loeseliastrum* (etc.) are not listed. This is curious, as the publication responsible for the delineation of genera in the family (Porter and Johnson 2000) is cited in the Further Reading, but it isn't followed in the list of genera in the family. Whether this is an oversight or simply a preference by the authors to follow an older taxonomy is unclear.

In the case where the book does not agree with APG IV, there is only a small divergence concerning only one genus (*Peltanthera*) and the APG IV recognized family of Calceolariaceae. The authors argue and place these two taxa in an expanded Gesneriaceae. Their rationale for this is based on distinguishing morphological characters and is explained in the introduction and in great depth under the description of their expanded Gesneriaceae.

Sadly, the liverworts, hornworts, and moss orders are not treated in this book. They are depicted in the formal phylogeny (p. 10), informally in the 'Tree of Life' near the base of the tree trunk (p. 11), and mentioned in the brief Evolution of Plants chapter

(p. 3), wherein a representative photo of each appears along the bottom of the page. It's curious that such a detail-oriented book that spans the scope of nearly all terrestrial land plants would choose to leave out the earliest diverging orders from their comprehensive—and frankly, quite impressive—treatment of all families of terrestrial plants.

Regardless, with or without the non-vascular plant orders, this is a big book. *Plants of the World* measures 9.5×11.5 inches, is 2 inches thick, and weighs in at 3.226 kg. For those of you that like U.S. customary units, that's a hefty 7.112 pounds! The production is of excellent quality, with an abundance of photos. The authors state the book is intended for a general audience; we believe it is a goal accomplished. It has not one, but two bookmark ribbons (one green, one yellow) that are necessary to hold onto multiple ventures deep into the many rabbit holes of the great diversity in the book *Plants of the World*.

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LITERATURE CITED

- BEENTJE, H. 2010. The Kew plant glossary, an illustrated dictionary of plant terms. Royal Botanic Gardens, Kew, England.
- CRONQUIST, A. 1981. An integrated system of classification of flowering plants. Columbia University Press, New York, NY.
- ENGLER, A. and K. PRANTL. 1887–1915. Die Natürlichen Pflanzenfamilien nebst ihren Gattungen und wichtigeren Arten, insbesondere den Nutzpflanzen, unter Mitwirkung zahlreicher hervorragender Fachgelehrten. 33 parts, 23 volumes. Engelmann, Leipzig, Germany.
- HUTCHINSON, J. 1973. The families of flowering plants, arranged according to a new system based on their probable phylogeny. 2 vols (Third ed.). Oxford at the Clarendon Press, Oxford, England.
- PORTER, J. and L. JOHNSON. 2000. A phylogenetic classification of Polemoniaceae. *Aliso* 19:55–91.